AMENDMENTS TO THE CLAIMS

Claims 1-11 (canceled)

Claim 12. (original): A method of manufacturing an optical-pickup slider comprising the steps of:

a) making a tapered through hole in a layer layered on a first substrate and having a thickness smaller than that of said first substrate; and

b) after bonding a light-transmitting-property substrate to a surface of said layer, removing said first substrate so as to expose an aperture at a tip of said tapered through hole.

Claim 13. (original): A method of manufacturing an optical-pickup slider comprising the steps of:

a) making a tapered through hole in a layer layered on a first substrate and having a thickness smaller than that of said first substrate; and

b) after bonding a light-transmitting-property substrate to a surface of said layer, removing said first substrate, and, then, making a ski shape or a pad shape in said layer at a position of an aperture at a tip of said tapered through hole.

Claim 14. (original): A method of manufacturing an optical-pickup slider comprising the steps of:

a) making a ski shape or a pad shape having a tapered through hole in a layer layered on a first substrate and having a thickness smaller than that of said first substrate; and

b) after bonding a light-transmitting-property substrate to a surface of said layer, removing said first substrate so as to expose an aperture at a tip of said tapered through hole.

Claim 15. (original): A method of manufacturing an optical-pickup slider comprising the steps of:

a) making a tapered through hole in a layer layered on a first substrate and having a thickness smaller than that of said first substrate; and

b) after providing a film of a non-light-transmitting-property material on at least an inclined surface of said tapered through hole, bonding a light-transmitting-property substrate to a surface of said layer, and, after removing said first substrate, removing a portion of the non-light-transmitting-property material at an aperture at a tip of said tapered through hole so as to expose said aperture.

Claim 16. (original): A method of manufacturing an optical-pickup slider comprising the steps of:

a) making a tapered through hole in a layer layered on a first substrate and having a thickness smaller than that of said first substrate; and

b) after forming eutectic of metal and said layer on at least an inclined surface of said tapered through hole, bonding a light-transmitting-property substrate to a surface of said layer, and removing said first substrate so as to expose an aperture at a tip of said tapered through hole.

Claim 17. (original): A method of manufacturing an optical-pickup slider comprising the steps of:

a) making a tapered through hole in an Si layer layered on a first substrate and having a thickness smaller than that of said first substrate; and

b) after lowering resistivity of a surface of at least an inclined surface of said tapered through hole, bonding a light-transmitting-property substrate to a surface of said layer, and removing said first substrate so as to expose an aperture at a tip of said tapered through hole.

Claim 18. (original): A probe comprising:

a substrate having a property of transmitting light; and a projecting portion formed on said substrate, and made of a material having a refractive index higher than that of said substrate,

wherein said projecting portion has light from said substrate incident thereon, and generates one of or both an optical near-field and propagation light at a tip thereof.

Claim 19. (original): The probe as claimed in claim 18, wherein said projecting portion is made of a single-crystal material having a refractive index higher than that of said substrate.

Claim 20. (original): The probe as claimed in claim 18, wherein said projecting portion is made of a single-crystal Si (silicon) having a refractive index higher than that of said substrate.

Claim 21. (original): The probe as claimed in claim 18, wherein said projecting portion is made from a Gap layer.

Claim 22. (original): The probe as claimed in claim 18, wherein said projecting portion is made of a material obtained as a result of a predetermined amount of impurities being mixed to a material having a refractive index higher than that of said substrate.

Claim 23. (original): The probe as claimed in claim 18, wherein said projecting portion is made of an n-type Si material having a refractive index higher than that of said substrate.

Claim 24. (original): The probe as claimed in claim 18, wherein said projecting portion is made of a high-concentration p-type Si material having a refractive index higher than that of said substrate.

Claim 25. (original): The probe as claimed in claim 18, wherein said projecting portion has a plurality of tapering angles on an outer wall thereof.

Claim 26. (original): The probe as claimed in claim 18, further comprising a bank portion having the same height as that of said projecting portion and arranged to surround said projecting portion.

Claim 27. (original): The probe as claimed in claim 18, further comprising a bank portion made of the same material as that of said projecting portion and arranged to surround said projecting portion.

Claim 28. (original): The probe as claimed in claim 18, wherein:

a rotating recording medium, on which information is recorded, is arranged at a tip of said projecting portion; and

said probe further comprises a bank portion arranged to surround said projecting portion and having an opening provided in a direction in which air flows due to rotation of the rotating recording medium.

Claim 29. (original): The probe as claimed in claim 28, wherein said projecting portion is located at a position such that a tip of said projecting portion and an end of said bank portion in a rotating-recording-medium-going-out direction coincide with one another in a direction perpendicular to a rotating-recording-medium-coming-in direction, or at a position such that said tip of said projecting portion is located on a rotating-recording-medium-coming-in side of said end of said bank portion.

Claim 30. (original): The probe as claimed in claim 28, wherein said bank portion has a tapered portion, inclined from a rotating-recording-medium-coming-in side of said substrate to a rotating-recording-medium-going-out side of said substrate, at an end thereof in a rotating-recording-medium-going-out direction.

Claim 31. (original): The probe as claimed in claim 28, wherein said bank portion has a tapered portion, inclined from a rotating-recording-medium-coming-in side of said substrate to a rotating-recording-medium-going-out side of said substrate, at a bank thereof in a rotating-recording-medium-coming-in direction.

Claim 32. (original): The probe as claimed in claim 28, wherein said bank portion has a tapered portion, inclined in a radial direction of the rotating recording medium, at a bank(s) approximately parallel to a rotating-recording-medium-coming-in direction.

Claim 33. (original): The probe as claimed in claim 28, wherein a length between an end of said substrate on a rotating-recording-medium-going-out side and a

tip of said projecting portion is determined based on a thickness thereof, a refractive index thereof and a numerical aperture of an optical component from which light is incident.

Claim 34. (original): The probe as claimed in claim 18, wherein:

a rotating recording medium, on which information is recorded, is arranged at a tip of said projecting portion; and

said probe further comprises: a bank portion made of the same material as that of said projecting portion, having the same height as that of said projecting portion and arranged to surround said projecting portion; and a pad portion made of the same material as that of said projecting portion, having the same height as that of said projecting portion and coming into contact with a facing side of the rotating recording medium.

Claim 35. (original): The probe as claimed in claim 34, wherein said pad portion is formed at a central position between a rotating-recording-medium-coming-in end and a rotating-recording-medium-going-out end of said substrate, or at a position in a range between ±0.1 from said central position assuming that an entire length of said substrate is 1.

Claim 36. (original): The probe as claimed in claim 18, wherein a light-blocking film is formed on said projecting portion and a side of said substrate on which said projecting portion is formed, or only on said projecting portion.

Claim 37. (original): The probe as claimed in claim 18, wherein a light-blocking film is formed on an inclined surface of said projecting portion and a side of

said substrate on which said projecting portion is formed, or only on the inclined surface of said projecting portion.

Claim 38. (original): A method of manufacturing a probe comprising the steps of:

a) bonding together a first substrate having a property of transmitting light and a second substrate comprising a high-refractive-index layer having a refractive index higher than that of said first substrate, an intermediate layer layered on said high-refractive-index layer and a supporting layer layered on said intermediate layer, in a condition in which said first substrate is in contact with said high-refractive-index layer;

b) removing said supporting layer included in said second substrate;

c) patterning by said intermediate layer exposed as a result of said supporting layer being removed;

d) etching said high-refractive-index layer using the patterned intermediate layer so as to form a cone-like or pyramid-like projecting portion on said first substrate; and

e) removing the patterned intermediate layer so that the probe having the cone-like or pyramid-like projecting portion made from said high-refractive-index layer on said first substrate be obtained.

Claim 39. (original): The method as claimed in claim 38, wherein said high-refractive-index layer is of Si and said intermediate layer is of SiO_2.

Claim 40. (original): The method as claimed in claim 38, wherein said high-refractive-index layer is of GaP and said intermediate layer is of SiO_2.

Claim 41. (original): The method as claimed in claim 38, wherein said high-refractive-index layer is of a single-crystal material, said intermediate layer is of SiO2 and said supporting layer is of Si.

Claim 42. (original): The method as claimed in claim 38, wherein said high-refractive-index layer is of a single-crystal Si, said intermediate layer is of SiO2 and said supporting layer is of Si.

Claim 43. (original): The method as claimed in claim 38, wherein, in the etching, the projecting portion is formed so as to have a plurality of tapering angles on an outer wall thereof.

Claim 44. (original): The method as claimed in claim 38, wherein, in the etching, a bank portion having the same height as that of said projecting portion and arranged to surround said projecting portion is further formed.

Claim 45. (original): The method as claimed in claim 38, wherein etching is performed on the same high-refractive -index layer and a bank portion having the same height as that of said projecting portion and arranged to surround said projecting portion is further formed.

Claim 46. (original): The method as claimed in claim 38, wherein:

said probe is such that a rotating recording medium, on which information is recorded, is arranged at a tip of said projecting portion; and

in the etching, a bank portion arranged to surround said projecting portion and having an opening provided in a direction, in which air flows due to rotation of the rotating recording medium, is further formed.

Claim 47. (original): The method as claimed in claim 46, wherein said bank portion has a tapered portion, inclined from a rotating-recording-medium-coming-in side of said first substrate to a rotating-recording-medium-going-out side of said first substrate, at an end thereof in a rotating-recording-medium-going-out direction.

Claim 48. (original): The method as claimed in claim 46, wherein said bank portion has a tapered portion, inclined from a rotating-recording-medium-coming-in side of said first substrate to a rotating-recording-medium-going-out side of said first substrate, at a bank thereof in a rotating-recording-medium-coming-in direction.

Claim 49. (original): The method as claimed in claim 46, wherein said bank portion has a tapered portion, inclined in a radial direction of the rotating recording medium, at a bank(s) approximately parallel to a rotating-recording-medium-coming-in direction.

Claim 50. (original): The method as claimed in claim 46, wherein a length between an end of said first substrate in a rotating-recording-medium-going-out direction and a tip of said projecting portion is determined based on a thickness thereof, a refractive index thereof and a numerical aperture of an optical component from which light is incident.

Claim 51. (original): The method as claimed in claim 38, wherein:

said probe is such that a rotating recording medium on which information is recorded is arranged at a tip of said projecting portion; and

etching is performed on the same high-refractive- index layer, and, said projecting portion, a bank portion arranged to surround said projecting portion and a

pad portion coming into contact with the rotating recording medium are formed on a side of said first substrate facing the rotating recording medium.

Claim 52. (original): The method as claimed in claim 51, wherein said pad portion is formed at a central position between a rotating-recording-medium-coming-in end and a rotating-recording-medium-going-out end of said first substrate, or at a position in a range between ±0.1 from said central position assuming that an entire length of said first substrate is 1.

Claim 53. (original): The method as claimed in claim 38, wherein, after said intermediate layer is removed, a light-blocking film is formed on said projecting portion and a side of said substrate on which said projecting portion is formed, or only on said projecting portion.

Claim 54. (original): The method as claimed in claim 38, wherein, after said intermediate layer is removed, a light-blocking film is formed on an inclined surface of said projecting portion and a side of said substrate on which said projecting portion is formed, or only on the inclined surface of said projecting portion.

Claim 55. (original): The method as claimed in claim 38, wherein, when patterning is performed by said intermediate layer, said intermediate layer is to have a predetermined thickness at a position of a tip of said projecting portion to be made and said intermediate layer at positions other than that of the tip of said projecting portion is to have a thickness equal to or smaller than said predetermined thickness.

Claim 56. (original): A method of manufacturing a probe comprising the steps of:

a) bonding together a first substrate having a property of transmitting light and a second substrate comprising a supporting layer, an intermediate layer formed on said supporting layer and a GaP layer formed on said intermediate layer, in a condition in which said first substrate and said GaP layer are in contact with one another;

b) removing said supporting layer included in said second substrate;

c) patterning by said intermediate layer; exposed as a result of said supporting layer being removed;

d) etching said GaP layer using the patterned intermediate layer so as to form a cone-like or pyramid-like projecting portion on said first substrate; and

e) removing the patterned intermediate layer so that the probe having the cone-like or pyramid-like projecting portion made from said GaP layer on said first substrate be obtained.

Claim 57. (original): The method as claimed in claim 56, wherein, in the etching, the projecting portion is formed so as to have a plurality of tapering angles on an outer wall thereof.

Claim 58. (original): The method as claimed in claim 56, wherein, in the etching, a bank portion having the same height as that of said projecting portion and arranged to surround said projecting portion is further formed.

Claim 59. (original): The method as claimed in claim 56, wherein etching is performed on the same GaP layer and a bank portion made of the same material as that of said projecting portion and arranged to surround said projecting portion is further formed.

Claim 60. (original): The method as claimed in claim 56, wherein:

said probe is such that a rotating recording medium, on which information is recorded, is arranged at a tip of said projecting portion; and

in the etching, a bank portion arranged to surround said projecting portion and having an opening provided in a direction in which air flows due to rotation of the rotating recording medium, is further formed.

Claim 61. (original): The method as claimed in claim 60, wherein said bank portion has a tapered portion, inclined from a rotating-recording-medium-coming-in side of said first substrate to a rotating-recording-medium-going-out side of said first substrate, at an end thereof in a rotating-recording-medium-going-out direction.

Claim 62. (original): The method as claimed in claim 60, wherein said bank portion has a tapered portion, inclined from a rotating-recording-medium-coming-in side of said first substrate to a rotating-recording-medium-going-out side of said first substrate, at a bank thereof in a rotating-recording-medium-coming-in direction.

Claim 63. (original): The method as claimed in claim 60, wherein said bank portion has a tapered portion, inclined in a radial direction of the rotating recording medium, at a bank(s) approximately parallel to a rotating-recording-medium-coming-in direction.

Claim 64. (original): The method as claimed in claim 60, wherein a length between an end of said first substrate in a rotating-recording-medium-going-out direction and a tip of said projecting portion is determined based on a thickness thereof, a refractive index thereof and a numerical aperture of an optical component from which light is incident.

Claim 65. (original): The method as claimed in claim 56, wherein:

said probe is such that a rotating recording medium on which information is recorded is arranged at a tip of said projecting portion; and

etching is performed on the same GaP layer, and, said projecting portion, a bank portion arranged to surround said projecting portion and a pad portion coming into contact with the rotating recording medium are formed on a side of said first substrate facing the rotating recording medium.

Claim 66. (original): The method as claimed in claim 65, wherein said pad portion is formed at a central position between a rotating-recording-medium-coming-in end and a rotating-recording-medium-going-out end of said first substrate, or at a position in a range between ±0.1 from said central position assuming that an entire length of said first substrate is 1.

Claim 67. (original): The method as claimed in claim 56, wherein, after said intermediate layer is removed, a light-blocking film is formed on said projecting portion and a side of said substrate on which said projecting portion is formed, or only on said projecting portion.

Claim 68. (original): The method as claimed in claim 56, wherein, after said intermediate layer is removed, a light-blocking film is formed on an inclined surface of said projecting portion and a side of said substrate on which said projecting portion is formed, or only on the inclined surface of said projecting portion.

Claim 69. (original): The method as claimed in claim 56, wherein, when patterning is performed by said intermediate layer, said intermediate layer is to have a predetermined thickness at a position of a tip of said projecting portion to be made and

said intermediate layer at positions other than that of the tip of said projecting portion is to have a thickness equal to or smaller than said predetermined thickness.

Claim 70. (original): A method of manufacturing a probe comprising the steps of:

a) bonding together a first substrate having a property of transmitting light and a second substrate comprising a low-concentration layer having a refractive index higher than that of said first substrate and having a predetermined amount of impurities mixed therein and a high-concentration layer having impurities more than said predetermined amount of impurities mixed therein, in a condition in which said first substrate and said low-concentration layer are in contact with one another;

b) removing said high-concentration layer included in said second substrate;

c) forming a patterning material on a surface of said low-concentration layer exposed as a result of said high-concentration layer being removed and patterning by said patterning material;

d) etching said low-concentration layer using the patterned patterning material so as to form a cone-like or pyramid-like projecting portion on said first substrate; and

e) removing the patterned patterning material so that the probe having the cone-like or pyramid-like projecting portion made from said low-concentration layer on said first substrate be obtained.

Claim 71. (original): The method as claimed in claim 70, wherein, in the etching, the projecting portion is formed so as to have a plurality of tapering angles on an outer wall thereof.

Claim 72. (original): The method as claimed in claim 70, wherein, in the etching, a bank portion having the same height as that of said projecting portion and arranged to surround said projecting portion is further formed.

Claim 73. (original): The method as claimed in claim 70, wherein etching is performed on the same low-concentration layer and a bank portion made of the same material as that of said projecting portion and arranged to surround said projecting portion is further formed.

Claim 74. (original): The method as claimed in claim 70, wherein:

said probe is such that a rotating recording medium, on which information is recorded, is arranged at a tip of said projecting portion; and

in the etching, a bank portion arranged to surround said projecting portion and having an opening provided in a direction in which air flows due to rotation of the rotating recording medium, is further formed.

Claim 75. (original): The method as claimed in claim 74, wherein said bank portion has a tapered portion, inclined from a rotating-recording-medium-coming-in side of said first substrate to a rotating-recording-medium-going-out side of said first substrate, at an end thereof in a rotating-recording-medium-going-out direction.

Claim 76. (original): The method as claimed in claim 74, wherein said bank portion has a tapered portion, inclined from a rotating-recording-medium-coming-in side of said first substrate to a rotating-recording-medium-going-out side of said first substrate, at a bank thereof in a rotating-recording-medium-coming-in direction.

Claim 77. (original): The method as claimed in claim 74, wherein said bank portion has a tapered portion, inclined in a radial direction of the rotating recording

medium, at a bank(s) approximately parallel to a rotating-recording-medium-coming-in direction.

Claim 78. (original): The method as claimed in claim 74, wherein a length between an end of said first substrate in a rotating-recording-medium-going-out direction and a tip of said projecting portion is determined based on a thickness thereof, a refractive index thereof and a numerical aperture of an optical component from which light is incident.

Claim 79. (original): The method as claimed in claim 70, wherein:

said probe is such that a rotating recording medium on which information is recorded is arranged at a tip of said projecting portion; and

etching is performed on the same low-concentration layer, and, said projecting portion, a bank portion arranged to surround said projecting portion and a pad portion coming into contact with the rotating recording medium are formed on a side of said first substrate facing the rotating recording medium.

Claim 80. (original): The method as claimed in claim 79, wherein said pad portion is formed at a central position between a rotating-recording-medium-coming-in end and a rotating-recording-medium-going-out end of said first substrate, or at a position in a range between ±0.1 from said central position assuming that an entire length of said first substrate is 1.

Claim 81. (original): The method as claimed in claim 70, wherein, after said patterning material is removed, a light-blocking film is formed on said projecting portion and a side of said substrate on which said projecting portion is formed, or only on said projecting portion.

Claim 82. (original): The method as claimed in claim 70, wherein, after said patterning material is removed, a light-blocking film is formed on an inclined surface of said projecting portion and a side of said substrate on which said projecting portion is formed, or only on the inclined surface of said projecting portion.

Claim 83. (original): The method as claimed in claim 70, wherein, when said patterning material is formed, said intermediate layer is to have a predetermined thickness at a position of a tip of said projecting portion to be made and said intermediate layer at positions other than that of the tip of said projecting portion is to have a thickness equal to or smaller than said predetermined thickness.

Claim 84. (original): A method of manufacturing a probe comprising the steps of:

a) bonding together a first substrate having a property of transmitting light and a second substrate comprising a n-type Si layer having a refractive index higher than that of said first substrate and a p-type Si layer, in a condition in which said first substrate and said n-type Si layer are in contact with one another;

b) removing said p-type Si layer included in said second substrate;

c) forming a patterning material on a surface of said n-type Si layer exposed as a result of said p-type Si layer being removed and patterning by said patterning material;

d) etching said n-type Si layer using the patterned patterning material so as to form a cone-like or pyramid-like projecting portion on said first substrate; and

e) removing the patterned patterning material so that the probe having the cone-like or pyramid-like projecting portion made from said n-type Si layer on said first substrate be obtained.

Claim 85. (original): The method as claimed in claim 84, wherein, in the etching, the projecting portion is formed so as to have a plurality of tapering angles on an outer wall thereof.

Claim 86. (original): The method as claimed in claim 84, wherein, in the etching, a bank portion having the same height as that of said projecting portion and arranged to surround said projecting portion is further formed.

Claim 87. (original): The method as claimed in claim 84, wherein etching is performed on the same n-type Si layer and a bank portion made of the same material as that of said projecting portion and arranged to surround said projecting portion is further formed.

Claim 88. (original): The method as claimed in claim 84, wherein:

said probe is such that a rotating recording medium, on which information is recorded, is arranged at a tip of said projecting portion; and

in the etching, a bank portion arranged to surround said projecting portion and having an opening provided in a direction in which air flows due to rotation of the rotating recording medium, is further formed.

Claim 89. (original): The method as claimed in claim 88, wherein said bank portion has a tapered portion, inclined from a rotating-recording-medium-coming-in side of said first substrate to a rotating-recording-medium-going-out side of said first substrate, at an end thereof in a rotating-recording-medium-going-out direction.

Claim 90. (original): The method as claimed in claim 88, wherein said bank portion has a tapered portion, inclined from a rotating-recording-medium-coming-in side of said first substrate to a rotating-recording-medium-going-out side of said first substrate, at a bank thereof in a rotating-recording-medium-coming-in direction.

Claim 91. (original): The method as claimed in claim 88, wherein said bank portion has a tapered portion, inclined in a radial direction of the rotating recording medium, at a bank(s) approximately parallel to a rotating-recording-medium-coming-in direction.

Claim 92. (original): The method as claimed in claim 88, wherein a length between an end of said first substrate in a rotating-recording-medium-going-out direction and a tip of said projecting portion is determined based on a thickness thereof, a refractive index thereof and a numerical aperture of an optical component from which light is incident.

Claim 93. (original): The method as claimed in claim 84, wherein:

said probe is such that a rotating recording medium on which information is recorded is arranged at a tip of said projecting portion; and

etching is performed on the same n-type Si layer, and, said projecting portion, a bank portion arranged to surround said projecting portion and a pad portion coming into contact with the rotating recording medium are formed on a side of said first substrate facing the rotating recording medium.

Claim 94. (original): The method as claimed in claim 93, wherein said pad portion is formed at a central position between a rotating-recording-medium-coming-in end and a rotating-recording-medium-going-out end of said first substrate, or at a

position in a range between ±0.1 from said central position assuming that an entire length of said first substrate is 1.

Claim 95. (original): The method as claimed in claim 84, wherein, after said patterning material is removed, a light-blocking film is formed on said projecting portion and a side of said substrate on which said projecting portion is formed, or only on said projecting portion.

Claim 96. (original): The method as claimed in claim 84, wherein, after said patterning material is removed, a light-blocking film is formed on an inclined surface of said projecting portion and a side of said substrate on which said projecting portion is formed, or only on the inclined surface of said projecting portion.

Claim 97. (original): The method as claimed in claim 84, wherein, when said patterning material is formed, said intermediate layer is to have a predetermined thickness at a position of a tip of said projecting portion to be made and said intermediate layer at positions other than that of the tip of said projecting portion is to have a thickness equal to or smaller than said predetermined thickness.

Claim 98. (original): A method of manufacturing a probe comprising the steps of:

a) bonding together a first substrate having a property of transmitting light and a second substrate comprising a high-concentration p-type Si layer having a refractive index higher than that of said first substrate and an n-type Si layer, in a condition in which said first substrate and said high-concentration p-type Si layer are in contact with one another;

b) removing said n-type Si layer included in said second substrate;

c) forming a patterning material on a surface of said high-concentration p-type Si layer exposed as a result of said n-type Si layer being removed and" patterning by said patterning material;

d) etching said high-concentration p-type Si layer using the patterned patterning material so as to form a cone-like or pyramid-like projecting portion on said first substrate; and

e) removing the patterned patterning material so that the prove having the cone-like or pyramid-like projecting portion made from said high-concentration p-type Si layer on said first substrate be obtained.

Claim 99. (original): The method as claimed in claim 98, wherein, in the etching, the projecting portion is formed so as to have a plurality of tapering angles on an outer wall thereof.

Claim 100. (original): The method as claimed in claim 98, wherein, in the etching, a bank portion having the same height as that of said projecting portion and arranged to surround said projecting portion is further formed.

Claim 101. (original): The method as claimed in claim 98, wherein etching is performed on the same high-concentration p-type Si layer and a bank portion made of the same material as that of said projecting portion and arranged to surround said projecting portion is further formed.

Claim 102. (original): The method as claimed in claim 98, wherein:

said probe is such that a rotating recording medium, on which information is recorded, is arranged at a tip of said projecting portion; and

in the etching, a bank portion arranged to surround said projecting portion and having an opening provided in a direction in which air flows due to rotation of the rotating recording medium, is further formed.

Claim 103. (original): The method as claimed in claim 102, wherein said bank portion has a tapered portion, inclined from a rotating-recording-medium-coming-in side of said first substrate to a rotating-recording-medium-going-out side of said first substrate, at an end thereof in a rotating-recording-medium-going-out direction.

Claim 104. (original): The method as claimed in claim 102, wherein said bank portion has a tapered portion, inclined from a rotating-recording-medium-coming-in side of said first substrate to a rotating-recording-medium-going-out side of said first substrate, at a bank thereof in a rotating-recording-medium-coming-in direction.

Claim 105. (original): The method as claimed in claim 102, wherein said bank portion has a tapered portion, inclined in a radial direction of the rotating recording medium, at a bank(s) approximately parallel to a rotating-recording-medium-coming-in direction.

Claim 106. (original): The method as claimed in claim 102, wherein a length between an end of said first substrate in a rotating-recording-medium-going-out direction and a tip of said projecting portion is determined based on a thickness thereof, a refractive index thereof and a numerical aperture of an optical component from which light is incident.

Claim 107. (original): The method as claimed in claim 98, wherein:

said probe is such that a rotating recording medium on which information is recorded is arranged at a tip of said projecting portion; and

etching is performed on the same high-concentration p-type Si layer, and, said projecting portion, a bank portion arranged to surround said projecting portion and a pad portion coming into contact with the rotating recording medium are formed on a side of said first substrate facing the rotating recording medium.

Claim 108. (original): The method as claimed in claim 107, wherein said pad portion is formed at a central position between a rotating-recording-medium-coming-in end and a rotating-recording-medium-going-out end of said first substrate, or at a position in a range between ±0.1 from said central position assuming that an entire length of said first substrate is 1.

Claim 109. (original): The method as claimed in claim 98, wherein, after said patterning material is removed, a light-blocking film is formed on said projecting portion and a side of said substrate on which said projecting portion is formed, or only on said projecting portion.

Claim 110. (original): The method as claimed in claim 98, wherein, after said patterning material is removed, a light-blocking film is formed on an inclined surface of said projecting portion and a side of said substrate on which said projecting portion is formed, or only on the inclined surface of said projecting portion.

Claim 111. (original): The method as claimed in claim 98, wherein, when said patterning material is formed, said intermediate layer is to have a predetermined thickness at a position of a tip of said projecting portion to be made and said intermediate layer at positions other than that of the tip of said projecting portion is to have a thickness equal to or smaller than said predetermined thickness.

Claim 112. (original): A probe array comprising:

a substrate having a property of transmitting light; and

a plurality of projecting portions formed on said substrate, made of a material having a refractive index higher than that of said substrate, and like cones or pyramids having tips, positions of which are aligned,

wherein each of said plurality of projecting portions has light from said substrate incident thereon, and generates one of or both an optical near-field and propagation light at the tip thereof.

Claim 113. (original): The probe array as claimed in claim 112, wherein each of said plurality of projecting portions is made of a single-crystal material having a refractive index higher than that of said substrate.

Claim 114. (original): The probe array as claimed in claim 112, wherein each of said plurality of projecting portions is made of a single-crystal Si (silicon) having a refractive index higher than that of said substrate

Claim 115. (original): The probe array as claimed in claim 112, wherein each of said plurality of projecting portions is made from a Gap layer.

Claim 116. (original): The probe array as claimed in claim 112, wherein each of said plurality of projecting portions is made of a material obtained as a result of a predetermined amount of impurities being mixed to a material having a refractive index higher than that of said substrate.

Claim 117. (original): The probe array as claimed in claim 112, wherein each of said plurality of projecting portions is made of an n-type Si material having a refractive index higher than that of said substrate.

Claim 118. (original): The probe array as claimed in claim 112, wherein each of said plurality of projecting portions is made of a high-concentration p-type Si material having a refractive index higher than that of said substrate.

Claim 119. (original): The probe array as claimed in claim 112,

wherein each of said plurality of projecting portions has a plurality of tapering angles on an outer wall thereof.

Claim 120. (original): The probe array as claimed in claim 112, further comprising a bank portion having the same height as that of said plurality of projecting portions and arranged to surround said plurality of projecting portions.

Claim 121. (original): The probe array as claimed in claim 112, further comprising a bank portion made of the same material as that of said plurality of projecting portions and arranged to surround said plurality of projecting portions.

Claim 122. (original): The probe array as claimed in claim 112, wherein:

a rotating recording medium, on which information is recorded, is arranged at the tips of said plurality of projecting portions; and

said probe array further comprises a bank portion arranged to surround said plurality of projecting portions and having an opening provided in a direction in which air flows due to rotation of the rotating recording medium.

Claim 123. (original): The probe array as claimed in claim 122, wherein each of said plurality of projecting portions is located at a position such that a tip of each of said plurality of projecting portions and an end of said bank portion in a rotating-recording-medium-going-out direction coincide with one another in a direction perpendicular to a rotating-recording-medium-coming-in direction, or at a position such that said tip of each of said plurality of projecting portions is located on a rotating-recording-medium-coming-in side of said end of said bank portion.

Claim 124. (original): The probe array as claimed in claim 122, wherein said bank portion has a tapered portion, inclined from a rotating-recording-medium-coming-in side of said substrate to a rotating-recording-medium-going- out side of said substrate, at an end thereof in a rotating-recording-medium-going-out direction.

Claim 125. (original): The probe array as claimed in claim 122, wherein said bank portion has a tapered portion, inclined from a rotating-recording-medium-coming-in side of said substrate to a rotating-recording-medium-going- out side of said substrate, at a bank thereof in a rotating-recording-medium-coming-in direction.

Claim 126. (original): The probe array as claimed in claim 122, wherein said bank portion has a tapered portion, inclined in a radial direction of the rotating recording medium, at a bank(s) approximately parallel to a rotating-recording-medium-coming-in direction.

Claim 127. (original): The probe array as claimed in claim 122, wherein a length between an end of said substrate in a rotating-recording-medium-going-out direction and the tip of each of said plurality of projecting portions is determined based on a thickness thereof, a refractive index thereof and a numerical aperture of an optical component from which light is incident.

Claim 128. (original): The probe array as claimed in claim 112, wherein:

a rotating recording medium, on which information is recorded, is arranged at the tips of said plurality of projecting portions; and

said probe array further comprises: a bank portion made of the same material as that of said plurality of projecting portions, and arranged to surround said plurality of projecting portions; and a pad portion made of the same material as that of said plurality of projecting portions, and coming into contact with the rotating recording medium.

Claim 129. (original): The probe array as claimed in claim 128, wherein said pad portion is formed at a central position between a rotating-recording-medium-coming-in end and a rotating-recording-medium-going-out end of said substrate, or at a position in a range between ±0.1 from said central position assuming that an entire length of said substrate is 1.

Claim 130. (original): The probe array as claimed in claim 112, wherein a light-blocking film is formed on each of said plurality of projecting portions and a side of said substrate on which said plurality of projecting portions are formed, or only on each of said plurality of projecting portions.

Claim 131. (original): The probe array as claimed in claim 112, wherein a light-blocking film is formed on an inclined surface of each of said plurality of projecting portions and a side of said substrate on which said plurality of projecting portions are formed, or only on the inclined surface of each of said plurality of projecting portions.

Claim 132. (original): A method of manufacturing a probe array comprising the steps of:

a) bonding together a first substrate having a property of transmitting light and a second substrate comprising a high-refractive-index layer having a refractive index higher than that of said first substrate, an intermediate layer layered on said high-refractive-index layer and a supporting layer layered on said intermediate layer, in a condition in which said first substrate is in contact with said high-refractive-index layer;

b) removing said supporting layer included in said second substrate;

c) patterning by said intermediate layer exposed as a result of said supporting layer being removed;

d) etching said high-refractive-index layer using the patterned intermediate layer so as to form a plurality of cone-like or pyramid-like projecting portions on said first substrate; and

e) removing the patterned intermediate layer so that the probe array having the plurality of cone-like or pyramid-like projecting portions made from said high-refractive-index layer on said first substrate be obtained.

Claim 133. (original): The method as claimed in claim 132, wherein said high-refractive-index layer is of Si and said intermediate layer is of SiO_2.

Claim 134. (original): The method as claimed in claim 132, wherein said high-refractive-index layer is of GaP and said intermediate layer is of SiO_2.

Claim 135. (original): The method as claimed in claim 132, wherein said high-refractive-index layer is of a single-crystal material, said intermediate layer is of SiO_2 and said supporting layer is of Si.

Claim 136. (original): The method as claimed in claim 132, wherein said high-refractive-index layer is of a single-crystal Si, said intermediate layer is of SiO_2 and said supporting layer is of Si.

Claim 137. (original): The method as claimed in claim 132, wherein, in the etching, each of the plurality of projecting portions is formed so as to have a plurality of tapering angles on an outer wall thereof.

Claim 138. (original): The method as claimed in claim 132,

wherein, in the etching, a bank portion having the same height as that of said plurality of projecting portions and arranged to surround said plurality of projecting portions is further formed.

Claim 139. (original): The method as claimed in claim 132, wherein etching is performed on the same high-refractive-index layer and a bank portion having the same height as that of said plurality of projecting portions and arranged to surround said plurality of projecting portions is further formed.

Claim 140. (original): The method as claimed in claim 132, wherein:

said probe array is such that a rotating recording medium, on which information is recorded, is arranged at tips of said plurality of projecting portions; and

in the etching, a bank portion arranged to surround said plurality of projecting portions and having an opening provided in a direction in which air flows due to rotation of the rotating recording medium, is further formed.

Claim 141. (original): The method as claimed in claim 140, wherein said bank portion has a tapered portion, inclined from a rotating-recording-medium-coming-in side of said first substrate to a rotating-recording-medium-going-out side of said first substrate, at an end thereof in a rotating-recording-medium-going-out direction.

Claim 142. (original): The method as claimed in claim 140, wherein said bank portion has a tapered portion, inclined from a rotating-recording-medium-coming-in side of said first substrate to a rotating-recording-medium-going-out side of said first substrate, at a bank thereof in a rotating-recording-medium-coming-in direction.

Claim 143. (original): The method as claimed in claim 140, wherein said bank portion has a tapered portion, inclined in a radial direction of the rotating recording medium, at a bank(s) approximately parallel to a rotating-recording-medium-coming-in direction.

Claim 144. (original): The method as claimed in claim 140, wherein a length of said first substrate in a rotating-recording-medium-moving direction is determined based on a thickness thereof, a refractive index thereof and a numerical aperture of an optical component from which light is incident.

Claim 145. (original): The method as claimed in claim 132, wherein:

said probe array is such that a rotating recording medium on which information is recorded is arranged at tips of said plurality of projecting portions; and

etching is performed on the same high-refractive-index layer, and, said plurality of projecting portions, a bank portion arranged to surround said plurality of

projecting portions and a pad portion coming into contact with the rotating recording medium are formed on a side of said first substrate facing the rotating recording medium.

Claim 146. (original): The method as claimed in claim 145,

wherein said pad portion is formed at a central position between a rotating-recording-medium-coming-in end and a rotating-recording-medium-going-out end of said first substrate, or at a position in a range between ±0.1 from said central position assuming that an entire length of said first substrate is 1.

Claim 147. (original): The method as claimed in claim 132, wherein, after said intermediate layer is removed, a light-blocking film is formed on each of said plurality of projecting portions and a side of said substrate on which said plurality of projecting portions are formed, or only on each of said plurality of projecting portions.

Claim 148. (original): The method as claimed in claim 132, wherein, after said intermediate layer is removed, a light-blocking film is formed on an inclined surface of each of said plurality of projecting portions and a side of said substrate on which said plurality of projecting portions are formed, or only on the inclined surface of each of said plurality of projecting portions.

Claim 149. (original): The method as claimed in claim 132, wherein, when patterning is performed by said intermediate layer, said intermediate layer is to have a predetermined thickness at positions of respective tips of said plurality of projecting portions to be made and said intermediate layer at positions other than those of the respective tips of said plurality of projecting portions is to have a thickness equal to or smaller than said predetermined thickness.

Claim 150. (original): A method of manufacturing a probe array comprising the steps of:

a) bonding together a first substrate having a property of transmitting light and a second substrate comprising a supporting layer, an intermediate layer formed on said supporting layer and a GaP layer formed on said intermediate layer, in a condition in which said first substrate and said GaP layer are in contact with one another;

b) removing said supporting layer included in said second substrate;

c) patterning by said intermediate layer exposed as a result of said supporting layer being removed;

d) etching said GaP layer using the patterned intermediate layer so as to form a plurality of cone-like or pyramid-like projecting portions on said first substrate; and

e) removing the patterned intermediate layer so that the probe array having the plurality of cone-like or pyramid-like projecting portions made from said GaP layer on said first substrate be obtained.

Claim 151. (original): The method as claimed in claim 150, wherein, in the etching, each of the plurality of projecting portions is formed so as to have a plurality of tapering angles on an outer wall thereof.

Claim 152. (original): The method as claimed in claim 150, wherein, in the etching, a bank portion having the same height as that of said plurality of projecting portions and arranged to surround said plurality of projecting portions is further formed.

Claim 153. (original): The method as claimed in claim 150,

wherein etching is performed on the same GaP layer and a bank portion made of the same material as that of said plurality of projecting portions and arranged to surround said plurality of projecting portions is further formed.

Claim 154. (original): The method as claimed in claim 150, wherein:

said probe array is such that a rotating recording medium, on which information is recorded, is arranged at tips of said plurality of projecting portions; and

in the etching, a bank portion arranged to surround said plurality of projecting portions and having an opening provided in a direction in which air flows due to rotation of the rotating recording medium, is further formed.

Claim 155. (original): The method as claimed in claim 154,

wherein said bank portion has a tapered portion, inclined from a rotating-recording-medium-coming-in side of said first substrate to a rotating-recording-medium-going-out side of said first substrate, at an end thereof in a rotating-recording-medium-going-out direction.

Claim 156. (original): The method as claimed in claim 154, wherein said bank portion has a tapered portion, inclined from a rotating-recording-medium-coming-in side of said first substrate to a rotating-recording-medium-going-out side of said first substrate, at a bank thereof in a rotating-recording-medium-coming-in direction.

Claim 157. (original): The method as claimed in claim 154, wherein said bank portion has a tapered portion, inclined in a radial direction of the rotating recording medium, at a bank(s) approximately parallel to a rotating-recording-medium-coming-in direction.

Claim 158. (original): The method as claimed in claim 154, wherein a length of said first substrate in a rotating-recording-medium-moving direction is determined based on a thickness thereof, a refractive index thereof and a numerical aperture of an optical component from which light is incident.

Claim 159. (original): The method as claimed in claim 150, wherein:

said probe array is such that a rotating recording medium on which information is recorded is arranged at tips of said plurality of projecting portions; and

etching is performed on the same GaP layer, and, said plurality of projecting portions, a bank portion arranged to surround said plurality of projecting portions and a pad portion coming into contact with the rotating recording medium are formed on a side of said first substrate facing the rotating recording medium.

Claim 160. (original): The method as claimed in claim 159, wherein said pad portion is formed at a central position between a rotating-recording-medium-coming-in end and a rotating-recording-medium-going-out end of said first substrate, or at a position in a range between ±0.1 from said central position assuming that an entire length of said first substrate is 1.

Claim 161. (original): The method as claimed in claim 150, wherein, after said intermediate layer is removed, a light-blocking film is formed on each of said plurality of projecting portions and a side of said substrate on which said plurality of projecting portions are formed, or only on each of said plurality of projecting portions.

Claim 162. (original): The method as claimed in claim 150, wherein, after said intermediate layer is removed, a light-blocking film is formed on an inclined surface of each of said plurality of projecting portions and a side of said substrate on

which said plurality of projecting portions are formed, or only on the inclined surface of each of said plurality of projecting portions.

Claim 163. (original): The method as claimed in claim 150, wherein, when patterning is performed by said intermediate layer, said intermediate layer is to have a predetermined thickness at positions of respective tips of said plurality of projecting portions to be made and said intermediate layer at positions other than those of the respective tips of said plurality of projecting portions is to have a thickness equal to or smaller than said predetermined thickness.

Claim 164. (original): A method of manufacturing a probe array

comprising the steps of:

a) bonding together a first substrate having a property of transmitting light and a second substrate comprising a low-concentration layer having a refractive index higher than that of said first substrate and having a predetermined amount of impurities mixed therein and a high-concentration layer having impurities more than said predetermined amount of impurities mixed therein, in a condition in which said first substrate and said low-concentration layer are in contact with one another;

b) removing said high-concentration layer included in said second substrate;

c) forming a patterning material on a surface of said low-concentration layer exposed as a result of said high-concentration layer being removed and patterning by said patterning material;

d) etching said low-concentration layer exposed by the patterning so as to form a plurality of cone-like or pyramid-like projecting portions on said first substrate; and

e) removing the patterned patterning material so that the probe array having the plurality of cone-like or pyramid-like projecting portions made from said low-concentration layer on said first substrate be obtained.

Claim 165. (original): The method as claimed in claim 164, wherein, in the etching, each of the plurality of projecting portions is formed so as to have a plurality of tapering angles on an outer wall thereof.

Claim 166. (original): The method as claimed in claim 164, wherein, in the etching, a bank portion having the same height as that of said plurality of projecting portions and arranged to surround said plurality of projecting portions is further formed.

Claim 167. (original): The method as claimed in claim 164, wherein etching is performed on the same low-concentration layer and a bank portion made of the same material as that of said plurality of projecting portions and arranged to surround said plurality of projecting portions is further formed.

Claim 168. (original): The method as claimed in claim 164, wherein:

said probe array is such that a rotating recording medium, on which information is recorded, is arranged at tips of said plurality of projecting portions; and

in the etching, a bank portion arranged to surround said plurality of projecting portions and having an opening provided in a direction in which air flows due to rotation of the rotating recording medium, is further formed.

Claim 169. (original): The method as claimed in claim 168, wherein said bank portion has a tapered portion, inclined from a rotating-recording-medium-coming-in side of said first substrate to a rotating-recording-medium-going-out side of

said first substrate, at an end thereof in a rotating-recording-medium-going-out direction.

Claim 170. (original): The method as claimed in claim 168, wherein said bank portion has a tapered portion, inclined from a rotating-recording-medium-coming-in side of said first substrate to a rotating-recording-medium-going-out side of said first substrate, at a bank thereof in a rotating-recording-medium-coming-in direction.

Claim 171. (original): The method as claimed in claim 168, wherein said bank portion has a tapered portion, inclined in a radial direction of the rotating recording medium, at a bank(s) approximately parallel to a rotating-recording-medium-coming-in direction.

Claim 172. (original): The method as claimed in claim 168, wherein a length of said first substrate in a rotating-recording-medium-moving direction is determined based on a thickness thereof, a refractive index thereof and a numerical aperture of an optical component from which light is incident.

Claim 173. (original): The method as claimed in claim 164, wherein:

said probe array is such that a rotating recording medium on which information is recorded is arranged at tips of said plurality of projecting portions; and

etching is performed on the same low-concentration layer, and, said plurality of projecting portions, a bank portion arranged to surround said plurality of projecting portions and a pad portion coming into contact with the rotating recording medium are formed on a side of said first substrate facing the rotating recording medium.

Claim 174. (original): The method as claimed in claim 173, wherein said pad portion is formed at a central position between a rotating-recording-medium-coming-in end and a rotating-recording-medium-going-out end of said first substrate, or at a position in a range between ±0.1 from said central position assuming that an entire length of said first substrate is 1.

Claim 175. (original): The method as claimed in claim 164, wherein, after said patterning material is removed; a light-blocking film is formed on each of said plurality of projecting portions and a side of said substrate on which said plurality of projecting portions are formed, or only on each of said plurality of projecting portions.

Claim 176. (original): The method as claimed in claim 164, wherein, after said patterning material is removed, a light-blocking film is formed on an inclined surface of each of said plurality of projecting portions and a side of said substrate on which said plurality of projecting portions are formed, or only on the inclined surface of each of said plurality of projecting portions.

Claim 177. (original): The method as claimed in claim 164, wherein, when said patterning material is formed, said intermediate layer is to have a predetermined thickness at positions of respective tips of said plurality of projecting portions to be made and said intermediate layer at positions other than those of the respective tips of said plurality of projecting portions is to have a thickness equal to or smaller than said predetermined thickness.

Claim 178. (original): A method of manufacturing a probe array comprising the steps of:

a) bonding together a first substrate having a property of transmitting light and a second substrate comprising a n-type Si layer having a refractive index higher

than that of said first substrate and a p-type Si layer, in a condition in which said first substrate and said n-type Si layer are in contact with one another;

b) removing said p-type Si layer included in said second substrate;

c) forming a patterning material on a surface of said n-type Si layer exposed as a result of said p-type Si layer being removed and patterning by said patterning material;

d) etching said n-type Si layer using the patterned patterning material so as to form a plurality of cone-like or pyramid-like projecting portions on said first substrate; and

e) removing the patterned patterning material so that the probe array having the plurality of cone-like or pyramid-like projecting portions made from said n-type Si layer on said first substrate be obtained.

Claim 179. (original): The method as claimed in claim 178, wherein, in the etching, each of the plurality of projecting portions is formed so as to have a plurality of tapering angles on an outer wall thereof.

Claim 180. (original): The method as claimed in claim 178, wherein, in the etching, a bank portion having the same height as that of said plurality of projecting portions and arranged to surround said plurality of projecting portions is further formed.

Claim 181. (original): The method as claimed in claim 178, wherein etching is performed on the same n-type Si layer and a bank portion made of the same material as that of said plurality of projecting portions and arranged to surround said plurality of projecting portions is further formed.

Claim 182. (original): The method as claimed in claim 178, wherein:

said probe array is such that a rotating recording medium, on which information is recorded, is arranged at tips of said plurality of projecting portions; and

in the etching, a bank portion arranged to surround said plurality of projecting portions and having an opening provided in a direction in which air flows due to rotation of the rotating recording medium, is further formed.

Claim 183. (original): The method as claimed in claim 182, wherein said bank portion has a tapered portion, inclined from a rotating-recording-medium-coming-in side of said first substrate to a rotating-recording-medium-going-out side of said first substrate, at an end thereof in a rotating-recording-medium-going-out direction.

Claim 184. (original): The method as claimed in claim 182, wherein said bank portion has a tapered portion, inclined from a rotating-recording-medium-coming-in side of said first substrate to a rotating-recording-medium-going-out side of said first substrate, at a bank thereof in a rotating-recording-medium-coming-in direction.

Claim 185. (original): The method as claimed in claim 182, wherein said bank portion has a tapered portion, inclined in a radial direction of the rotating recording medium, at a bank(s) approximately parallel to a rotating-recording-medium-coming-in direction.

Claim 186. (original): The method as claimed in claim 182, wherein a length of said first substrate in a rotating-recording-medium-moving direction is determined

based on a thickness thereof, a refractive index thereof and a numerical aperture of an optical component from which light is incident.

Claim 187. (original): The method as claimed in claim 178, wherein:

said probe array is such that a rotating recording medium on which information is recorded is arranged at tips of said plurality of projecting portions; and

etching is performed on the same n-type Si layer, and, said plurality of projecting portions, a bank portion arranged to surround said plurality of projecting portions and a pad portion coming into contact with the rotating recording medium are formed on a side of said first substrate facing the rotating recording medium.

Claim 188. (original): The method as claimed in claim 187, wherein said pad portion is formed at a central position between a rotating-recording-medium-coming-in end and a rotating-recording-medium-going-out end of said first substrate, or at a position in a range between ±0.1 from said central position assuming that an entire length of said first substrate is 1.

Claim 189. (original): The method as claimed in claim 178, wherein, after said patterning material is removed, a light-blocking film is formed on each of said plurality of projecting portions and a side of said substrate on which said plurality of projecting portions are formed, or only on each of said plurality of projecting portions.

Claim 190. (original): The method as claimed in claim 178, wherein, after said patterning material is removed, a light-blocking film is formed on an inclined surface of each of said plurality of projecting portions and a side of said substrate on which said plurality of projecting portions are formed, or only on the inclined surface of each of said plurality of projecting portions.

Claim 191. (original): The method as claimed in claim 178, wherein, when said patterning material is formed, said intermediate layer is to have a predetermined thickness at positions of respective tips of said plurality of projecting portions to be made and said intermediate layer at positions other than those of the respective tips of said plurality of projecting portions is to have a thickness equal to or smaller than said predetermined thickness.

Claim 192. (original): A method of manufacturing a probe array comprising the steps of:

a) bonding together a first substrate having a property of transmitting light and a second substrate comprising a high-concentration p-type Si layer having a refractive index higher than that of said first substrate and an n-type Si layer, in a condition in which said first substrate and said high-concentration p-type Si layer are in contact with one another;

b) removing said n-type Si layer included in said second substrate;

c) forming a patterning material on a surface of said high-concentration p-type Si layer exposed as a result of said n-type Si layer being removed and patterning by said patterning material;

d) etching said high-concentration p-type Si layer using the patterned patterning material so as to form a plurality of cone-like or pyramid-like projecting portions on said first substrate; and

e) removing the patterned patterning material so that the probe array having the plurality of cone-like or pyramid-like projecting portions made from said high-concentration p-type Si layer on said first substrate be obtained.

Claim 193. (original): The method as claimed in claim 192, wherein, in the etching, each of the plurality of projecting portions is formed so as to have a plurality of tapering angles on an outer wall thereof.

Claim 194. (original): The method as claimed in claim 192, wherein, in the etching, a bank portion having the same height as that of said plurality of projecting portions and arranged to surround said plurality of projecting portions is further formed.

Claim 195. (original): The method as claimed in claim 192, wherein etching is performed on the same high-concentration p-type Si layer and a bank portion made of the same material as that of said plurality of projecting portions and arranged to surround said plurality of projecting portions is further formed.

Claim 196. (original): The method as claimed in claim 192, wherein:

said probe array is such that a rotating recording medium, on which information is recorded, is arranged at tips of said plurality of projecting portions; and

in the etching, a bank portion arranged to surround said plurality of projecting portions and having an opening provided in a direction in which air flows due to rotation of the rotating recording medium, is further formed.

Claim 197. (original): The method as claimed in claim 196, wherein said bank portion has a tapered portion, inclined from a rotating-recording-medium-coming-in side of said first substrate to a rotating-recording-medium-going-out side of said first substrate, at an end thereof in a rotating-recording-medium-going-out direction.

Claim 198. (original): The method as claimed in claim 196, wherein said bank portion has a tapered portion, inclined from a rotating-recording-medium-coming-in side of said first substrate to a rotating-recording-medium-going-out side of said first substrate, at a bank thereof in a rotating-recording-medium-coming-in-direction.

Claim 199. (original): The method as claimed in claim 196, wherein said bank portion has a tapered portion, inclined in a radial direction of the rotating recording medium, at a bank(s) approximately parallel to a rotating-recording-medium-coming-in direction.

Claim 200. (original): The method as claimed in claim 196, wherein a length of said first substrate in a rotating-recording-medium-moving direction is determined based on a thickness thereof, a refractive index thereof and a numerical aperture of an optical component from which light is incident.

Claim 201. (original): The method as claimed in claim 192, wherein:

said probe array is such that a rotating recording medium on which information is recorded is arranged at tips of said plurality of projecting portions; and

etching is performed on the same high-concentration p-type Si layer, and, said plurality of projecting portions, a bank portion arranged to surround said plurality of projecting portions and a pad portion coming into contact with the rotating recording medium are formed on a side of said first substrate facing the rotating recording medium.

Claim 202. (original): The method as claimed in claim 201, wherein said pad portion is formed at a central position between a rotating-recording-medium-coming-in

end and a rotating-recording-medium-going-out end of said first substrate, or at a position in a range between ±0.1 from said central position assuming that an entire length of said first substrate is 1.

Claim 203. (original): The method as claimed in claim 192, wherein, after said patterning material is removed, a light-blocking film is formed on each of said plurality of projecting portions and a side of said substrate on which said plurality of projecting portions are formed, or only on each of said plurality of projecting portions.

Claim 204. (original): The method as claimed in claim 192, wherein, after said patterning material is removed, a light-blocking film is formed on an inclined surface of each of said plurality of projecting portions and a side of said substrate on which said plurality of projecting portions are formed, or only on the inclined surface of each of said plurality of projecting portions.

Claim 205. (original): The method as claimed in claim 192, wherein, when said patterning material is formed, said intermediate layer is to have a predetermined thickness at positions of respective tips of said plurality of projecting portions to be made and said intermediate layer at positions other than those of the respective tips of said plurality of projecting portions is to have a thickness equal to or smaller than said predetermined thickness.

Claim 206. (new): An optical-pickup slider comprising:

a layer layered on a first substrate and having a thickness smaller than that of said first substrate,

wherein:

a tapered through hole is made in said layer; and

after a surface of a light-transmitting-property substrate is bonded to a surface of said layer, said first substrate is removed, and, then, a ski shape or a pad shape is made in said layer at a position of an aperture at a tip of said tapered through hole; and

wherein the bonded surface of said light-transmitting-property substrate has a flat-plate shape.

Claim 207. (new): The optical-pickup slider of claim 210, wherein said flat-plate shaped surface is located at least in the vicinity of said tapered through hole.

Claim 208. (new): An optical-pickup slider comprising:

a layer layered on a first substrate and having a thickness smaller than that of said first substrate,

wherein:

a ski shape or a pad shape having a tapered through hole is made in said layer; and

after a surface of a light-transmitting-property substrate is bonded to a surface of said layer, said first substrate is removed so that an aperture at a tip of said tapered through hole is exposed;

wherein the bonded surface of said light-transmitting-property substrate has a flat-plate shape.

Claim 209. (new): The optical-pickup slider of claim 212, wherein said flat-plate shaped surface is located at least in the vicinity of said tapered through hole.